

INVESTIGATION ON THE OPTIMUM REHABILITATION METHOD IN REPAIRING ROAD DEFECT

MAIZATUL NUR SYAFIQA BTE MOHD
IDRIS

B. ENG(HONS.) CIVIL ENGINEERING

UNIVERSITI MALAYSIA PAHANG



STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

A handwritten signature in black ink, appearing to read 'Maizatul Nur Syafiqah Binti Mohd Idris', written over a horizontal line.

(Student's Signature)

Full Name : MAIZATUL NUR SYAFIQAH BINTI MOHD IDRIS

ID Number : AA 15068

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MAIZATUL NUR SYAFIQAH BTE MOHD IDRIS

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ABSTRAK

Kertas kerja ini menerangkan kajian mengenai pegurusan penyelenggaraan jalan raya adalah penting untuk mengekalkan rangkaian jalan bagi memudahkan pergerakan pengguna. Penyelenggaraan jalan raya yang tidak berkala boleh membawa kepada kerosakkan struktur jalan. Selain itu, kerosakkan jalan raya boleh menyebabkan peningkatan tahap bahaya kepada pengguna dan sekaligus menyumbang kepada kemalangan jalan raya dan juga dapat meningkatkan kos penyelenggaraan jalan raya. Kajian ini dijalankan untuk mengenal pasti jenis penyeleggaran yang dipraktikan di Melaka; mengenalpasti jenis-jenis kerosakkan jalan raya yang sering berlaku dan juga penggunaan kaedah pemulihan yang optimum untuk mengatasi kerosakkan jalan raya. Justeru itu, soal selidik telah disediakan berdasarkan kajian literature, sesi temu bual serta diedarkan kepada 55 responden yang terlibat dalam pembinaan jalan; pemulihan, pemeliharaan dan penyelenggaraan jalan raya. Kajian ini melibatkan skala (kedudukan) iaitu dari 1 (sangat kurang penting), 2 (kurang penting), 3 (sederhana penting), 4 (sangat penting) dan 5 (tersangat penting) kepada kaedah penyeleggaran yang optimum yang dijangkakan. Daripada analisis data menggunakan kaedah relatif indeks kepentingan (RII), menunjukkan terdapat beberapa jenis kerosakkan jalan raya yang sering berlaku yang menyumbang kepada kemalangan jalan raya telah dikenalpasti. Selain itu, kajian ini juga mengenal pasti kaedah pemulihan yang optimum untuk mengatasi kerosakan jalan raya supaya boleh diamalkan untuk pengurusan penyelenggaraan yang lebih baik dan berkesan.

ABSTRACT

This paper describes the application of road maintenance management is crucial in order to maintain the road network for the safe and convenient movement of people and goods. An improperly maintenance of road can lead to the damage of the road structure. Other than that, road damage can represent an increasing of hazard to users that can contribute to road accidents and also increased the maintenance cost. This study is conducted to identify the current practice of road maintenance at Melaka; to identify the types of defects and common defects occurred and also the optimum rehabilitation method use to overcome the defects. Then, questionnaire was prepared based on literature review study, interview session and directed to 55 respondents involving with contractor and company that expert in new construction, pavement rehabilitation, pavement preservation and road maintenance. The survey was involving to give a scale (rank) from 1(very low importance), 2 (low importance), 3 (medium importance), 4 (high importance), and 5 (extremely high importance) to the expected optimum rehabilitation method. From the data analysis using relative importance index (RII) method, there are several types of defects that usually occur that may contribute to road accidents has been identified. Apart from these, this study also identified the optimum rehabilitation method to overcome the defects of the roads which could be practiced for better and more effective of maintenance management.

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LIST OF ABBREVIATIONS

VOC	Vehicle Operating Costs
OECD	Organisation for Economic Co-Operation and Development
HIPR	Hot in-place Recycling
HMA	Hot Mix Asphalt
RII	Relative Importance Index

CHAPTER 1

INTRODUCTION

1.1 Introduction

Road maintenance is a continuous process that involves keeping and repairing the existing road. Road maintenance is carried out to control the rate damage and to ensure the safety towards the road users or the public. According to (Pamphlet et al., 1975) maintenance was identified as any action that have been took to retain the serviceable condition of the material or to restore its serviceability.

Thus, the maintenance is done in order to ensure the durability of the road, to maintain the usage for the traffic and to decrease the accidents occur cause by failure of road defects. In reality, maintenance works are not given the attention, it should have a budget allocated for maintenance work in which seldom become a prior consideration. However, it is a fact that maintenance is the most important activity to be carried out to prolong or at least maintain the serviceability of road until the end of service life. This research is conducted to study on the optimum rehabilitation method in repairing the road defects.

1.2 Background of Study

Malaysia is moving towards becoming a developed country. The road requirements begins since the invention of wheel in Samaria in 3000Bc' (dulrhman Abushnaf, 2015). Since then, the road construction has slowly developed over a very long period from the barely earth or soil surface to the highway or pavement surface. Basically, road are one of the most importance aspects in movement, which directly affect the movement of people and goods throughout the cosmos, and it has become

rapidly increased in the pavement infrastructure development in Malaysia, mostly road linking the state capitals, airports, railroad stations and ports, gazetted under Federal Roads Ordinance.

Presently, Malaysia has more than 82,144 km roads, and the roads are divided into three primary classes, namely toll expressway 1,820 (km), federal roads 18,904 (km) and state roads & municipality roads 61,420 (km) and the life span between five years which launched by the Federal Government (Zakaria,2005). Basically, construction of road in Malaysia was implemented by the Federal Government and State Government. However, since mid-1980s, the construction of toll expressway has been started by private companies who then authorized by the government.

As rapidity of development in Malaysia has contributes to the economic growth, it has indirectly increases vehicle occupancy over years. Unceasingly, road facilities experience failure more rapidly than expected due to the increases of traffic volume and insufficient degree of maintenance. Therefore, maintenance the road is important to make sure the traffic flow smoothly. Nevertheless, maintenance is intended to begin on the first day after the road improvement works completed. Although the need for maintenance is widely recognized, it is still not getting adequately done. Most of the country just spend 20-50 percent of their road network maintenance after the works completed (Burningham & Natalya Stankevich, 2006).

Maintenance activities may be required at intervals throughout the years, but their frequency varies with traffic, topography and climatic conditions, types of road, grading and repairing the defects of the roads. However, to ensure the road is well maintain, there needs to be a study of problems that generally occur based on the particular road conditions, suitable type of maintenance to be carried out and factor contributed to road failure. Malaymail on 21st November 2017 reported that Malaysia road management system was unsuccessful in lowering the number of road accident due to the failure of efforts to improve the road safety. A systematic approach to the maintenance and rehabilitation of a road defects needed to be analyse so that they are able to satisfy the increasing demand placed on a road network due to increased traffic and decreasing the amount of accidents.

1.3 Problem Statement

Accidents are relatively unpredictable. In Malaysia, a lot of concern is directed towards accident statistics which rises alarmingly high especially during the festive breaks (Abdul Rahman, 2012). More than 3,500 people are killed and 137,000 injured in road crashes worldwide every day (Road Safety Department Malaysia, 2006). It can happen by a combination of tiredness of drivers and poor road geometry or poor vehicle condition and poor maintenance of the road. Besides, failure or the damage of the road is one of the contributing factors of road accidents. Road maintenance must be carried out continuously so that the road conditions can provide comfort and safety to all the road users. Hence, road maintenance practices must be effective to ensure effective solutions to road damage.

There have a lot of accidents occurred in Melaka since 2008 until 2017. Based on Transport Statistics Malaysia on 2017 reported that there is an increasing of 169 of the road accidents occur in 2016 to 2017 which are from 18601 to 18771 of road accidents. Sinar Online on 9th December 2014 reported that the car has been drove by the teachers inverted after hit the puddle. The accident occurs due to the poor maintenance of road and the heavy rain that make the puddle full by the water. Public transportation expert, Prof Dr Abd Rahim Md Nor revealed that when it rains, puddles will appear and the surface fatigue of the wheel load causes the holes to increase in their diameter and depth, thus it will rapidly endangering motorists or especially those who are using smaller vehicles (Bernama, 2012).

Without proper maintenance and using the wrong method of rehabilitation, the road will become easy to failure in short term where will also lead to the increasing of traffic accident. Besides, it also will contribute to the shortage of the damaged of road repairs. Insufficient level of expenditure or poor management of the road network often has serious consequences for the economic and social life of a country in terms of vehicle operating costs (VOC), travel time costs, accident costs and environment impact (Salih et al., 2016). Some of the accident will occur because of pavement problem, landslide, and some other factors that contribute to the accident.

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